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EXAMINER	
PRINCE, JESSICA MARIE	

ART UNIT	PAPER NUMBER
2482	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/500,453	CHIANG ET AL.	
	Examiner	Art Unit	
	JESSICA PRINCE	2482	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 November 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5-7,10-16,25,26 and 30-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *5-7,10-16,25,26 and 30-33* is/are allowed.

6)☒ Claim(s) *34-46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 11/19/2010 have been fully considered but they are not persuasive.

As to applicants argument that Lee does not teach or suggest "generating second metric values from input data of the input video using respective second encoding parameters"

The examiner respectfully disagrees. Lee discloses we then select a reference macroblock that has the average scaling factor γ_{avg}. Since the reference block should characterize the coded pictures, we chose a MB_intra, MB_FORWARD, and MB_BACKWARDcoded macroblock for I, P, and B pictures, respectively. While encoding the reference macroblock, we adjust the initial quantization parameter Q_{init} such that the number of actual coding bits is close to the average number of coding bits B_{ang} for the macroblock. Since Lee discloses to select the reference macroblock that has the closest scaling factor, where the scaling factor is the normalized local activity, and to adjust the initial quantization parameter, it is clear to the examiner that Lee discloses to determine local activity of a reference block which reads upon the claimed limitation, 2.3 Adaptive Quantization).

As to Applicants argument that Lee does not discloses "selecting at least one of the second encoding parameters.. "

The Examiner respectfully disagrees. discloses the normalized local activity is N_act_j is defined as:

$$N\_act_j = \frac{2 \times act_j + avg\_act}{act_j + 2 \times avg\_act} \qquad (11)$$

Further disclosed is for estimating the reference quantization parameter for each macroblock, we define the following equation based on the rate distortion theory:

$$q_i = 2^C \times \gamma_i \qquad (13)$$

Where C is a parameter that controls the bit rate, and γ_i scaling factor which characterizes the proprieties of the current macroblock. Further disclosed is where we may use N_act_j in Eq. (11) as the scaling factor γ_i, for macroblock *i*. Further, while encoding the reference macroblock we adjust the initial quantization parameter such that the number of actual coding bits is close to the average number of coding bits B_{avg} for the macroblock. The value of C is then calculated from Eq. 13. 3.2 Reference Quantization Parameter and Eq. 13-18). Since Lee discloses the local activity is the scaling factor for the macroblock, and to adjust the quantization parameter such that the number of actual coding bits are close to the average number of coding bits (where the number of coding bits is directly related to the target number of bits), which is used to calculate the parameter that controls the bit rate, it is clear to the examiner that there is a relationship (where the average bit rate is close to the target bit rate) among the quantization parameter and the parameter that controls the bit rate, which reads upon the claimed limitation)

As to Applicants argument that Lee cannot describe "first metric values" and "second metric values" generated as recited in claim 1.

The examiner respectfully disagrees and directs the Applicant the response provided above.

As to Applicants argument that none of the references appears to teach of suggest features that are missing from Lee. Oikawa does not teach "determining a relationship between first and second metric values and respective quantities of encoded video data" based on a reference video and using such a determined relationship as par of "selecting... encoding parameters" for encoding an input video that is distinct from the reference video.

The examiner respectfully disagrees. It is the combination of the Lee (modified by Oikwa) references that teaches the claimed invention. In this case, the examiner relied upon Oikwa for the teaching of a memory. Therefore, taking the teachings of Lee where disclosed is a predetermined relationship (see 3.2 Reference Quantization Parameter) with Oikawas' teaching of a memory now incorporates all the elements of claim 35. Now, Lee incorporating the memory Oikawa reads upon the claimed limitation.

As to Applicants argument that neither the compression method of Pullen, nor the dynanmic allocation of network resources of Wu appears to teach or suggest such features recited by claim 34.

The examiner respectfully disagrees. It is the combination of the Lee (modified by Pullen) references that was relied upon in the rejection of claim 34. In this case, Lee teaches Lee discloses the normalized local activity is N_act_j is defined as:

$$N\_act_j = \frac{2 \times act_j + avg\_act}{act_j + 2 \times avg\_act} \qquad (11)$$

Further disclosed is for estimating the reference quantization parameter for each macroblock, we define the following equation based on the rate distortion theory:

$$q_i = 2^C \times \gamma_i \qquad (13)$$

Where C is a parameter that controls the bit rate, and γ_i scaling factor which characterizes the properties of the current macroblock. Further disclosed is where we may use N_act_j in Eq. (11) as the scaling factor γ_i, for macroblock *i*. Further, while encoding the reference macroblock we adjust the initial quantization parameter such that the number of actual coding bits is close to the average number of coding bits B_{avg} for the macroblock. The value of C is then calculated from Eq. 13. 3.2 Reference Quantization Parameter and Eq. 13-18). Since Lee discloses the local activity is the scaling factor for the macroblock, and to adjust the quantization parameter such that the number of actual coding bits are close to the average number of coding bits (where the number of coding bits is directly related to the target number of bits), which is used to calculate the parameter that controls the bit rate, it is clear to the examiner that the determined relationship (where the average bit rate is close to the target bit rate) among the quantization parameter and the parameter that controls the bit rate, which reads upon the claimed limitation), the first metric values generated by encoding reference

video data from a reference video data from a reference video using a metric function (we then select a reference macroblock that has the average scaling factor γ_{avg}. Since the reference block should characterize the coded pictures, we chose a MB_intra, MB_FORWARD, and MB_BACKWARDcoded macroblock for I, P, and B pictures, respectively. While encoding the reference macroblock, we adjust the initial quantization parameter Q_{init} such that the number of actual coding bits is close to the average number of coding bits B_{ang} for the macroblock. Since Lee discloses to select the reference macroblock that has the closest scaling factor, where the scaling factor is the normalized local activity, and to adjust the initial quantization parameter, it is clear to the examiner that Lee discloses to determine local activity of a reference block which reads upon the claimed limitation, 2.3 Adaptive Quantization) and respective first encoding parameters (quantization parameter *q* 3.2. Reference Quantization Parameter); receiving an input video distinct from the reference video (fig. 1) the reference video including a plurality of macroblocks ; generating second metric values from input video data of the input video using respective second encoding parameters (Lee discloses where the reference quantization parameter of macroblock *i* is calculated as:

$$Q_i = Q_{ref} + \Delta \qquad (21)$$

where Q_{ref} is the reference quantization parameter of the current macroblock, and Δ is the amount of quantization step size to be adjusted. Since the initial quantization is determined with respect to the reference quantization, and is used to determine the parameter that controls the bit rate, therefore, it is clear to the examiner that Lee discloses to use the bit rate control parameter with respect to the reference quantization parameter, which reads upon the claimed limitation); and

selecting at least one of said second encoding parameters on the basis of a desired quantity of encoding video and the relationship between the fist metric values and the respective quantities of encoded data (Lee discloses the normalized local activity is N_act_j is defined as:

$$N\_act_j = \frac{2 \times act_j + avg\_act}{act_j + 2 \times avg\_act} \quad (11)$$

Further disclosed is for estimating the reference quantization parameter for each macroblock, we define the following equation based on the rate distortion theory:

$$q_i = 2^C \times \gamma_i \quad (13)$$

Where C is a parameter that controls the bit rate, and γ_i scaling factor which characterizes the proprieties of the current macroblock. Further disclosed is where we may use N_act_j in Eq. (11) as the scaling factor γ_i, for macroblock *i*. Further, while encoding the reference macroblock we adjust the initial quantization parameter such that the number of actual coding bits is close to the average number of coding bits B_{avg} for the macroblock. The value of C is then calculated from Eq. 13. 3.2 Reference Quantization Parameter and Eq. 13-18). Since Lee discloses the local activity is the scaling factor for the macroblock, and to adjust the quantization parameter such that the number of actual coding bits are close to the average number of coding bits (where the number of coding bits is directly related to the target number of bits), which is used to calculate the parameter that controls the bit rate, it is clear to the examiner that there is a relationship (where the average bit rate is close to the target bit rate) among the quantization parameter and the parameter that controls the bit rate, which reads upon

the claimed limitation); and encoding the input video data using the selected at least one encoding parameter (2.1 Bit allocation).

Lee is silent in regards to a video encoder that is at least one of a configured hardware circuit and a programmed computer.

However, Pullen teaches a video encoder that is at least one configured hardware circuit and a programmed computer (compression methods may be implemented by a general purpose computer executing instructions storing in a memory to generate a compressed representation of data set usually stored in a working memory (col.1 line 55-58).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Pullens' computer based method and system with Lee in order to run and process the disclosed algorithm of Lee.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 34, 36, 37, 39 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., Target Bit Matching for MPEG-2 Video Rate Control in view of Pullen et al., US-5,923,376.

As per **claim 34**, Lee teaches a method comprising: determining a relationship between first metric values and respective quantities of encoded video data (Lee discloses the normalized local activity is N_act_j is defined as:

$$N\_act_j = \frac{2\times act_j + avg\_act}{act_j + 2\times avg\_act} \qquad (11)$$

Further disclosed is for estimating the reference quantization parameter for each macroblock, we define the following equation based on the rate distortion theory:

$$q_i = 2^C \times \gamma_i \qquad (13)$$

Where C is a parameter that controls the bit rate, and γ_i scaling factor which characterizes the properties of the current macroblock. Further disclosed is where we may use N_act_j in Eq. (11) as the scaling factor γ_i, for macroblock *i*. Further, while encoding the reference macroblock we adjust the initial quantization parameter such that the number of actual coding bits is close to the average number of coding bits B_{avg} for the macroblock. The value of C is then calculated from Eq. 13. 3.2 Reference Quantization Parameter and Eq. 13-18). Since Lee discloses the local activity is the scaling factor for the macroblock, and to adjust the quantization parameter such that the number of actual coding bits are close to the average number of coding bits (where the

number of coding bits is directly related to the target number of bits), which is used to calculate the parameter that controls the bit rate, it is clear to the examiner that the determined relationship (where the average bit rate is close to the target bit rate) among the quantization parameter and the parameter that controls the bit rate, which reads upon the claimed limitation), the first metric values generated by encoding reference video data from a reference video, <u>the reference video including a plurality of macroblocks,</u> using a metric function (we then select a reference macroblock that has the average scaling factor γ_{avg}. Since the reference block should characterize the coded pictures, we chose a MB_intra, MB_FORWARD, and MB_BACKWARDcoded macroblock for I, P, and B pictures, respectively. While encoding the reference macroblock, we adjust the initial quantization parameter Q_{init} such that the number of actual coding bits is close to the average number of coding bits B_{ang} for the macroblock. Since Lee discloses to select the reference macroblock that has the closest scaling factor, where the scaling factor is the normalized local activity, and to adjust the initial quantization parameter, it is clear to the examiner that Lee discloses to determine local activity of a reference block which reads upon the claimed limitation, 2.3 Adaptive Quantization. Since the reference block should characterize the coded pictures, we chose a MB_intra, MB_FORWARD, and MB_BACKWARDcoded macroblock for I, P, and B pictures, respectively, clearly the video includes I, P, B macroblocks, reading on the claimed limitation) and respective encoding parameters (quantization parameter q 3.2. Reference Quantization Parameter); generating second metric values from input

video data of the input video using respective second encoding parameters (Lee discloses where the reference quantization parameter of macroblock i is calculated as:

$$Q_i = Q_{ref} + \Delta \qquad (21)$$

where Q_{ref} is the reference quantization parameter of the current macroblock, and Δ is the amount of quantization step size to be adjusted. Since the initial quantization is determined with respect to the reference quantization, and is used to determine the parameter that controls the bit rate, therefore, it is clear to the examiner that Lee discloses to use the bit rate control parameter with respect to the reference quantization parameter, which reads upon the claimed limitation); and selecting at least one of said second encoding parameters on the basis of a desired quantity of encoding video and the relationship between the fist metric values and the respective quantities of encoded data (Lee discloses the normalized local activity is N_act_j is defined as:

$$N\_act_j = \frac{2 \times act_j + avg\_act}{act_j + 2 \times avg\_act} \qquad (11)$$

Further disclosed is for estimating the reference quantization parameter for each macroblock, we define the following equation based on the rate distortion theory:

$$q_i = 2^C \times \gamma_i \qquad (13)$$

Where C is a parameter that controls the bit rate, and γ_i scaling factor which characterizes the proprieties of the current macroblock. Further disclosed is where we may use N_act_j in Eq. (11) as the scaling factor γ_i, for macroblock i. Further, while encoding the reference macroblock we adjust the initial quantization parameter such that the number of actual coding bits is close to the average number of coding bits B_{avg}

for the macroblock. The value of C is then calculated from Eq. 13. 3.2 Reference Quantization Parameter and Eq. 13-18). Since Lee discloses the local activity is the scaling factor for the macroblock, and to adjust the quantization parameter such that the number of actual coding bits are close to the average number of coding bits (where the number of coding bits is directly related to the target number of bits), which is used to calculate the parameter that controls the bit rate, it is clear to the examiner that there is a relationship (where the average bit rate is close to the target bit rate) among the quantization parameter and the parameter that controls the bit rate, which reads upon the claimed limitation); and encoding the input video data using the selected at least one encoding parameter (2.1 Bit allocation).

Lee does not explicitly disclose to receiving an input video, the input video including a plurality of macroblocks distinct from the plurality of macroblocks of the reference video; a video encoder that is at least one of a configured hardware circuit and a programmed computer.

However, it is obvious that when encoding video, the encoder will receive input video containing macroblocks and where reference video contains macroblocks that are different (distinct) from the input video.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate to receive input video containing macroblocks and where reference video contains macroblocks that are different (distinct) from the input video, in order to perform video encoding.

Lee does not explicitly disclose a video encoder that is at least one of a configured hardware circuit and a programmed computer.

However, Pullen teaches a video encoder that is at least one configured hardware circuit and a programmed computer (compression methods may be implemented by a general purpose computer executing instructions storing in a memory to generate a compressed representation of data set usually stored in a working memory (col.1 line 55-58).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Pullens' computer based method and system with Lee in order to run and process the disclosed algorithm of Lee.

As per **claim 36**, Lee (modified by Pullen) as a whole teaches everything as claimed above, see claim 34. In addition, Lee teaches the method of claim 34, wherein the determining the relationship between first metric values and respective quantities of encoded video data is performed as part of a calibration process, and wherein the receiving the input video occurs after the calibration process is performed (3.2 Proposed Algorithm).

As per **claim 37**, Lee (modified by Pullen) as a whole teaches everything as claimed above, see claim 34. In addition, Lee teaches the method of claim 34, wherein the relationship is a power law relationship ((3.2 Reference Quantization Parameter, Eq. (13)).

As per **claim 39**, Lee (modified by Pullen) as a whole teaches everything as claimed above, see claim 34. In addition, Lee teaches determining basic metric values

from the metric function and basic encoding parameters ; and deriving metric values from the basic metric values (Lee discloses for estimating the reference quantization parameter for each macroblock, we define the following equation based on the rate distortion theory: $q_i = 2^C \times \gamma_i$ (13). As understood by the examiner, the basic metric function is a quantization vector (see applicants disclosure [0054 - 0056] and table 2-3, and Lee discloses the reference quantization parameter is a vector, it is clear to the examiner that the reference quantization parameter reads upon the claimed limitation).

As per **claim 41**, Lee (modified by Pullen) as a whole teaches everything as claimed above, see claim 34. In addition, Lee teaches the method of claim 34, wherein the selecting (Introduction) the at least one of the second encoding parameters (Introduction) based on a desired quantity of encoded video data (Lee discloses the normalized local activity is N_act_j is defined as:

$$N\_act_j = \frac{2 \times act_j + avg\_act}{act_j + 2 \times avg\_act} \quad (11)$$

Further disclosed is for estimating the reference quantization parameter for each macroblock, we define the following equation based on the rate distortion theory:

$$q_i = 2^C \times \gamma_i \quad (13)$$

Where C is a parameter that controls the bit rate, and γ_i scaling factor which characterizes the proprieties of the current macroblock. Further disclosed is where we may use N_act_j in Eq. (11) as the scaling factor γ_i, for macroblock *i*. Further, while encoding the reference macroblock we adjust the initial quantization parameter such

that the number of actual coding bits is close to the average number of coding bits B_{avg} for the macroblock. The value of C is then calculated from Eq. 13. 3.2 Reference Quantization Parameter and Eq. 13-18); and the relationship between the first metric values and the respective quantities of encoded video data is perform using the second metric values (Lee discloses where the reference quantization parameter of macroblock *i* is calculated as:

$$Q_i = Q_{ref} + \Delta \qquad (21)$$

where Q_{ref} is the reference quantization parameter of the current macroblock, and Δ is the amount of quantization step size to be adjusted. Since the initial quantization is determined with respect to the reference quantization, and is used to determine the parameter that controls the bit rate, therefore, it is clear to the examiner that Lee discloses to use the bit rate control parameter with respect to the reference quantization parameter, which reads upon the claimed limitation).

4. Claims 35 and 42, 44-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., Target Bit Matching for MPEG-2 Video Rate Control in view of Pullen et al., US-5,923,376 in view of Oikawa et al., US-5,677,734.

As per **claim 35**, Lee (modified by Pullen) as a whole teaches everything as claimed above, see claim 34. Lee is silent in regards to the method of claim 34 further including, after the determining relationship between first metric values and respective quantities of encoded video data and before receiving the input video, storing the relationship for use in the selecting at least one of the second encoding parameters based on the desired quantity of encoded video data and the relationship.

However, Oikawa teaches storing the relationship for use in the selecting at least one of the second parameters based on the desired quantity of encoded video data and the relationship (a picture memory. Therefore, taking the teachings of a predetermined relationship with Oikawas' teaching of a memory now incorporates all the elements of claim 35. Now, Lee incorporating the memory Oikawa reads upon the claimed limitation).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Oikawa with Lee for providing improved image quality.

As per **claim 42**, which is substantially the same as claim 34, in addition to a memory configured to store a predetermined relationship between first metric values and respective quantities of encoded video; a predictor module, a selector module and a processor configured to execute the predictor module. Thus, the rejection and analysis made for claim 34 also applies here for common subject matter. In addition, Lee teaches a predictor module (fig. 1); a selector (Lee discloses where in order to obtain uniform picture quality within each picture within each picture, we should select an appropriate coding parameter for each MB, see Introduction. Although, Lee does not explicitly discloses a selector, the examiner notes that in order to perform the selection of the coding parameter, there must exist a device or module that selects, which reads upon the claimed limitation). Lee is silent in regards to memory configured to store a predetermined relationship between first metric and values and respective quantities of encoded video; a processor configured to execute the predictor module.

Lee is silent in regards to a processor configured to execute the predictor module.

However, Pullen discloses where compression methods may be implemented by a general purpose computer executing instructions stored in memory to generate a compressed representation of a data set usually stored in a memory, col. 1 line 55-58. Therefore, the combination of Lee (modified by Oikawa and Pullen) as whole disclose a computer based method and system, reading upon the claimed limitation).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Pullens' computer based method and system with Lee in order to run and process the disclosed algorithm of Lee.

Lee (modified by Pullen) is silent in regards to memory configured to store a predetermined relationship between first metric and values and respective quantities of encoded video. However, Oikawa teaches a memory configured to store a predetermined relationship between first metric and values and respective quantities of encoded video (a picture memory. Therefore, taking the teachings of a predetermined relationship with Oikawas' teaching of a memory now incorporates all the elements of claim 42. Now, Lee incorporating the memory Oikawa reads upon the claimed limitation).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Oikawa with Lee (modified by Pullen) for providing improved image quality.

As per **claim 43**, Lee (modified by Pullen and Oikawa) as a whole teaches everything as claimed above, see claim 42. In addition, Lee teaches the method of claim 42, wherein the relationship is a power law relationship ((3.2 Reference Quantization Parameter, Eq. (13)).

As per **claim 45**, Lee (modified by Pullen) as a whole teaches everything as claimed above, see claim 34. Lee is silent in regards to the method of claim 34 wherein the first and second encoding parameters are quantization vectors.

However, Oikawa teaches wherein the first and second encoding parameters are quantization vectors (the first quantization unit determines a quantization step in terms of a video segment made up of plural macro-blocks as a unit so that the quantity of quantized data is less than a pre-set data quantity, while the second quantization unit decision unit determines a quantization step in terms of the macro-blocks as a unit so that the quantity of quantized data is less than the pre-set data quantity. The quantization unit quantizes the digital video signals with the quantization steps determined by the first quantization step decision unit and the second quantization step decision unit. This enables the degree of quantization to be refined in a range of a pre-set data quantity of quantized data to render it possible to make effective utilization of redundant bits, thus assuring efficient encoding and improved picture quality, column 2 line 63 to column 3 line 4 and fig, 6. Therefore, it is clear to the examiner that Oikawa discloses to select the quantization step size based on the quantity of VLC data as shown in fig. 6, which reads upon the claimed limitation).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Oikawa with Lee (modified by Pullen) for providing improved image quality.

As per **claim 46**, Lee (modified by Pullen and Oikawa) as a whole teaches everything as claimed above, see claim 42. Lee is silent in regards to the video encoding module of claim 42 wherein the first and second encoding parameters are quantization vectors.

However, However, Oikawa teaches wherein the first and second encoding parameters are quantization vectors (the first quantization unit determines a quantization step in terms of a video segment made up of plural macro-blocks as a unit so that the quantity of quantized data is less than a pre-set data quantity, while the second quantization unit decision unit determines a quantization step in terms of the macro-blocks as a unit so that the quantity of quantized data is less than the pre-set data quantity. The quantization unit quantizes the digital video signals with the quantization steps determined by the first quantization step decision unit and the second quantization step decision unit. This enables the degree of quantization to be refined in a range of a pre-set data quantity of quantized data to render it possible to make effective utilization of redundant bits, thus assuring efficient encoding and improved picture quality, column 2 line 63 to column 3 line 4 and fig, 6. Therefore, it is clear to the examiner that Oikawa discloses to select the quantization step size based on the quantity of VLC data as shown in fig. 6, which reads upon the claimed limitation).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Oikawa with Lee (modified by Pullen) for providing improved image quality.

5. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., Target Bit Matching for MPEG-2 Video Rate Control in view of Pullen et al., US-5,923,376 in view of Wu et al., US-6,974,378.

As per **claim 38**, Lee (modified by Pullen) as a whole teaches everything as claimed above, see claim 34. In addition, Lee teaches the method of claim 34, wherein the metric function is one of at least: based on AC coefficients of discrete cosine transformation data generated from video data (Lee discloses where we may use N_act_j in Eq. (11) as the scaling factor γ_i as the scaling factor, for γ_i macroblock *i*. However, since a good measure of the human visual sensitivity is the power of AC coefficients normalized by the DC value, we can define the scaling factor:

$$\gamma_i = \sqrt{\frac{\sum_{j=0}^{3}\sum_{k=1}^{63} dct_{i,j,k}^2}{232}}\,\frac{128}{\max(DC, DC_{min})} \qquad (14)$$

Therefore, it is clear to the examiner that Lee discloses a metric function that is based on the AC coefficients of the macroblock normalized by the DC coefficients, which reads upon the claimed limitation). Lee is silent in regards to wherein the metric function is a spatial activity metric function based on a sum of weighted AC discrete cosine transformation coefficients.

However, Wu teaches wherein said metric function is a spatial activity metric function based on a sum of weighted AC discrete cosine transformation coefficients (The spatial complexity can be estimated using a weighted sum of the magnitudes of the AC coefficients for each macroblock of the I-Frame, column 8 line 12-14).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Wu with Lee (modified by Pullen) for providing improved picture quality.

Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., Target Bit Matching for MPEG-2 Video Rate Control in view of Pullen et al., US-5,923,376 in view of Boice et al., US-5,644,504.

As per **claim 40**, Lee (modified by Pullen) as whole teaches everything as claimed above, see claim 34. Lee is silent in regards to the method of claim 39, wherein the deriving metric values includes deriving the metric values from the basic metric values using shift and add operations.

However, Boice teaches using shift and add operations (Quantization is a process to determine the stepsize per macroblock. Stepsize is based on the light intensity variances of the macroblock. The average of intensity of the macroblock is first calculated. Variances of each block are then determined. The smallest variance is used to select the stepsize for the macroblock. In the processor described herein, the average intensity can be calculated by ADDACC and shift instructions, column 7 line 41-47). Therefore, it is clear to the examiner that Boice discloses to use shift and add operations, which reads upon the claimed limitation.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Boice with Lee for more efficient image coding.

6. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al., Target Bit Matching for MPEG-2 Video Rate Control in view of Pullen et al., US-5,923,376 in view of Oikawa et al., US-5,677,734, and in view of Wu et al., US-6,974,378.

As per **claim 44**, Lee (modified by Pullen and Oikawa) as a whole teaches everything as claimed above, see claim 42. In addition, Lee teaches the video encoding module of claim 42, where the metric function is one of at least: based on AC coefficients of discrete cosine transformation data generated from video data (Lee discloses where we may use N_act$_j$ in Eq. (11) as the scaling factor γ_i as the scaling factor, for γ_i macroblock *i*. However, since a good measure of the human visual sensitivity is the power of AC coefficients normalized by the DC value, we can define the scaling factor:

$$\gamma_i = \sqrt{\frac{\sum_{j=0}^{3}\sum_{k=1}^{63} dct_{i,j,k}^2}{232}}\,\frac{128}{\max(DC, DC_{\min})} \qquad (14)$$

Therefore, it is clear to the examiner that Lee discloses a metric function that is based on the AC coefficients of the macroblock normalized by the DC coefficients, which reads upon the claimed limitation).

Lee (modified by Pullen and Oikawa) is silent in regards to wherein the metric function is a spatial activity metric function based on a sum of weighted AC discrete cosine transformation coefficients.

However, Wu teaches wherein said metric function is a spatial activity metric function based on a sum of weighted AC discrete cosine transformation coefficients (The spatial complexity can be estimated using a weighted sum of the magnitudes of the AC coefficients for each macroblock of the I-Frame, column 8 line 12-14).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Wu with Lee (modified by Pullen and Oikawa) for providing improved picture quality.

Allowable Subject Matter

1. Claims 5-7, 10-16, and 25-26 and 30-33 are allowed.

2. The following is a statement of reasons for the indication of allowable subject matter:

3. The following is a statement of reasons for the indication of allowable subject matter. The present invention as claimed involves a metric function of the form u , v f (u , v) w (u , v) q (u , v) ,where f(u,v) is a discrete cosine transformation coefficient of a block element with coordinates (u,v), w(u,v) is a weight for said coefficient, and q(u,v) is a quantization parameter for said coefficient.

4. The prior art of record fails to anticipate or render obviousness the limitations of the claimed invention where the metric function is of the form u , v f (u , v) w (u , v) q (u , v) ,where f(u,v) is a discrete cosine transformation coefficient of a block element with coordinates (u,v), w(u,v) is a weight for said coefficient, and q(u,v) is a quantization parameter for said coefficient.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JESSICA PRINCE whose telephone number is (571)270-1821. The examiner can normally be reached on 7:30-5:00 EST Monday-Friday, Alt Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha D. Banks-Harold can be reached on (571) 272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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